

Claims

[c1] **WHAT IS CLAIMED IS:**

1. A system for automatically and dynamically laying out elements within a window, comprising:
specifying at least one dynamically resizable frame in a hierarchical tree structure within a parent window;
specifying at least one child element within at least one of the dynamically resizable frames;
automatically hierarchically computing a size of each dynamically resizable frame based on the hierarchical tree structure, beginning with any child elements within each frame, up to the parent window, and then back down to the individual child elements within each frame;
automatically creating a minimum sufficient number of horizontal rows within at least one dynamically resizable frame for displaying each of the child elements within each dynamically resizable frame; and
automatically arranging child elements within the automatically created horizontal rows.

[c2] 2. The system of claim 1 wherein at least one dynamically resizable frame includes any number of nested frames, with at least one of the nested frames further including any number of child elements.

[c3] 3. The system of claim 1 wherein the window is resizable, and wherein elements within at least one frame are automatically arranged as the window is resized.

[c4] 4. The system of claim 3 wherein the window is user resizable.

[c5] 5. The system of claim 3 wherein the window is automatically resized.

[c6] 6. The system of claim 1 further comprising specifying preferred vertical margins between the automatically created horizontal rows within at least one dynamically resizable frame.

[c7] 7. The system of claim 1 further comprising automatically adjusting a width

of at least one of the dynamically resizable frames by a specified amount.

[c8] 8. The system of claim 1 further comprising automatically indenting at least one of the automatically created horizontal rows within at least one dynamically resizable frame.

[c9] 9. The system of claim 1 further comprising automatically aligning at least one child element within at least one of the automatically created horizontal rows within at least one of the dynamically resizable frames.

[c10] 10. The system of claim 9 wherein automatically aligning at least one child element comprises vertically aligning the at least one child element within at least one row of at least one dynamically resizable frame.

[c11] 11. The system of claim 9 wherein automatically aligning at least one child element comprises horizontally aligning the at least one child element within at least one row of at least one dynamically resizable frame.

[c12] 12. The system of claim 9 wherein automatically aligning at least one child element comprises vertically and horizontally aligning the at least one child element within at least one row of at least one dynamically resizable frame.

[c13] 13. The system of claim 1 further comprising automatically vertically distributing the automatically created horizontal rows within at least one dynamically resizable frame to fill an available vertical space within the at least one dynamically resizable frame.

[c14] 14. The system of claim 1 further comprising automatically equally distributing at least one child element within at least one of the automatically created horizontal rows.

[c15] 15. The system of claim 1 further comprising binding at least two child elements in groups of two or more for controlling how the groups wrap into the automatically created horizontal rows.

[c16] 16. The system of claim 1 further comprising automatically determining and

reporting on which automatically created horizontal rows within at least one dynamically resizable frame holds particular child elements.

- [c17] 17. The system of claim 1 further comprising automatically expanding particular child elements to fill particular automatically created horizontal rows.
- [c18] 18. The system of claim 1 wherein at least one of the child elements includes at least one associated control.
- [c19] 19. The system of claim 18 wherein at least one of the controls is a text control.
- [c20] 20. The system of claim 19 wherein any text contained within the text control is automatically wrapped to at least two lines within the text control without using an additional automatically created horizontal row where the text is too wide to fit as a single unwrapped text line within a particular automatically created horizontal row.
- [c21] 21. A computer-implemented process for automatically arranging controls within a window of a graphical user interface, comprising:
 - constructing at least one dynamically resizable frame within a parent window;
 - inserting at least one control frame having at least one associated control into at least one dynamically resizable frame;
 - defining a preferred interrelationship between at least two controls in at least one of the dynamically resizable frames;
 - automatically creating a minimum sufficient number of horizontal rows within at least one dynamically resizable frame for displaying the controls within any of the dynamically resizable frames; and
 - automatically arranging the controls within the automatically created horizontal rows in accordance with any preferred interrelationships between the controls.
- [c22] 22. The computer-implemented process of claim 21 further comprising

automatically computing a size of each dynamically resizable frame based on a hierarchical tree structure which defines a structural relationship between each dynamically resizable frame and each control within each dynamically resizable frame within the parent window.

- [c23] 23. The computer-implemented process of claim 21 wherein the window is resizable, and wherein controls within at least one dynamically resizable frame are automatically arranged as the window is resized.
- [c24] 24. The computer-implemented process of claim 21 further comprising an ability to customize the automatic arrangement of elements within at least one of the automatically created horizontal rows of at least one of the dynamically resizable frames by specifying any of:
 - a preferred vertical margin between the horizontal rows;
 - a preferred width of at least one of the dynamically resizable frames;
 - a preferred indenting of at least one of the horizontal rows;
 - a preferred horizontal alignment of at least one control within at least one of the horizontal rows;
 - a preferred vertical alignment of at least one control within at least one of the horizontal rows;
 - a preferred vertical distribution of horizontal rows within at least one dynamically resizable frame;
 - a preferred horizontal distribution of controls within at least one of the horizontal rows; and
 - a preferred expansion of at least one control within at least one of the horizontal rows.
- [c25] 25. The computer-implemented process of claim 21 further comprising automatically determining and reporting on which automatically created horizontal rows within at least one dynamically resizable frame holds particular child elements.
- [c26] 26. The computer-implemented process of claim 21 wherein at least one of the controls is a text control, and wherein any text contained within the text

control is automatically wrapped to at least two lines within the text control where the text is too wide to fit as a single unwrapped text line within a particular horizontal row.

[c27] 27. A computer-readable medium having computer executable instructions for automatically organizing elements within a user resizable dialog window, said computer executable instructions comprising:
adding at least one automatically reconfigurable frame to a parent window;
inserting at least one child element into at least one automatically reconfigurable frame;
specifying preferred indenting rules for at least one of the child elements;
dynamically creating wrapable horizontal rows within at least one automatically reconfigurable frame for displaying each of the child elements within any of the automatically reconfigurable frames; and
automatically arranging child elements within the dynamically created wrapable horizontal rows in accordance with any specified preferred indenting rules as the resizable window is resized.

[c28] 28. The computer-readable medium of claim 27 further comprising creating a hierarchical tree structure which defines a structural relationship between each automatically reconfigurable frame and each child element within the parent window.

[c29] 29. The computer-readable medium of claim 28 further comprising using the hierarchical tree structure to automatically compute a size of each automatically reconfigurable frame.

[c30] 30. The computer-readable medium of claim 27 further comprising a capability of nesting any number of frames within at least one automatically reconfigurable frame, with at least one nested frame further including any number of child elements.

[c31] 31. The computer-readable medium of claim 27 further comprising specifying any of:

a preferred vertical margin between the dynamically created wrapable horizontal rows within at least one automatically reconfigurable frame; a preferred width of the dynamically created wrapable horizontal rows within at least one automatically reconfigurable frame; and a preferred indenting width of at least one of the dynamically created wrapable horizontal rows within at least one automatically reconfigurable frame.

- [c32] 32. The computer-readable medium of claim 27 further comprising automatically aligning at least one child element within at least one automatically reconfigurable frame in accordance a specified preferred alignment of at least one child element.
- [c33] 33. The computer-readable medium of claim 27 further comprising automatically vertically distributing the dynamically created wrapable horizontal rows within at least one automatically reconfigurable frame to fill an available vertical space within the at least one automatically reconfigurable frame.
- [c34] 34. The computer-readable medium of claim 27 further comprising automatically equally distributing each child element within at least one of the dynamically created wrapable horizontal rows.
- [c35] 35. The computer-readable medium of claim 27 further comprising binding at least two child elements in groups of two or more for controlling how the groups wrap into the dynamically created wrapable horizontal rows.
- [c36] 36. The computer-readable medium of claim 27 further comprising automatically determining and reporting on which dynamically created wrapable horizontal rows hold particular child elements.
- [c37] 37. The computer-readable medium of claim 27 further comprising automatically expanding particular child elements to fill particular dynamically created wrapable horizontal rows.

[c38] 38. The system of claim 32 wherein automatically aligning at least one child element comprises vertically aligning the at least one child element within at least one dynamically created wrapable horizontal row.

[c39] 39. The system of claim 32 wherein automatically aligning at least one child element comprises horizontally aligning the at least one child element within at least one dynamically created wrapable horizontal row.

[c40] 40. The system of claim 32 wherein automatically aligning at least one child element comprises vertically and horizontally aligning the at least one child element within at least one dynamically created wrapable horizontal row.